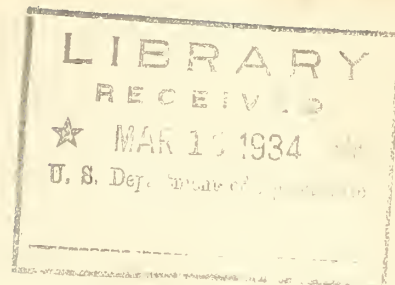


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UNITED STATES DEPARTMENT OF AGRICULTURE
Weather Bureau

Office of the Chief

December 1, 1933.

CIRCULAR

INSTRUCTIONS FOR CODING AIRPLANE OBSERVATIONS AND
TRANSMITTING SAME TO DISTRICT FORECAST CENTERS.

(1) The following instructions will become effective on January 1, 1934, and will supersede all those previously issued.

(2) The messages should be transmitted by commercial telegraph and filed not later than 8:00 a. m., 75th Mer. When flights are made late according to the schedules and too late to be filed before noon, E. S. T., a copy of the data will be forwarded promptly by mail to the Central Office (in envelope marked "Airplane data for Forecast Room") and to the District Forecast Centers authorized to receive them by telegraph.

(3) When a flight is not made or if for any reason the record cannot be used, no telegram will be sent but the facts will be transmitted by mail in the same manner as provided in the preceding paragraph.

(4) Since telegraphic messages ordinarily show the place of origin, the name of station will not be included in the body of the message unless the place of filing is not the same as the station.

(5) When several surfaces of temperature discontinuity occur close to one another and the differences in lapse rates between them are inappreciable, only the lowermost and uppermost surfaces of discontinuity will be telegraphed. Similarly, in the case of relative humidity, when the differences in the vertical gradients are inappreciable, the same rule will be followed. Judgment must be exercised in individual cases in this connection, keeping in mind the necessity for the reports to indicate the significant discontinuities.

(6) No airplane records will be transmitted by code unless the height reached is 1500 meters or more above sea level.

(7) The first word in the message will indicate the time (75th Mer.) or take-off. This will be given to the nearest hour on the 0-23 hour basis.

Examples: 5 a. m. (FIVE); 2 p. m. (FOURTEEN); etc.

(8) The second word in the message will indicate the surface pressure to the nearest even millibar at the time of the take-off. This word will be taken from the "Pressure-Temperature" words, pp. 19-28, Weather Code (1931). Odd values will be changed to even according to the Weather Bureau rule for dropping decimals.

Examples: 987 will be coded as 986; 977 as 978; etc.

(9) The units and tens place digits will be indicated by the second code element in the word and the hundreds and thousands place digits by the first code element.

Examples: 986 (TURSIN); 873 (SURROGATE); 1022 (UNDAM)

It will be noted that when the pressure is 1000 mbs., or more, the hundreds and thousands place digits are not indicated in the code word, these always being understood when the word begins with the letter U.

(10) The third word in the message will indicate the surface temperature ($^{\circ}\text{C}$) and relative humidity at the time of the take-off. The same set of code words will be used as for pressure. The temperature will be indicated by the first code element in the word and the humidity by the second code element.

(11) The decimal in the temperature figure will be dropped according to the Weather Bureau rule, e. g., 14.6°C . will be changed to 15°C . This latter value will then be doubled (30°C) thus making it possible to transmit odd values. Negative temperatures, likewise, will be doubled after disposing of the decimal and the complement then coded as explained above.

(12) Odd values of relative humidity will be changed to even according to the Weather Bureau rule. Examples: 87% will be changes to 86%; 77% to 78%; etc. Humidities of 3% or less will be coded as 2% and those of 99% and 100% will be coded as zero.

Examples: 14.6°C ., 49% (FULGOR)
 11.3°C ., 1% (DACAPO)
 22.6°C ., 100% (GIG)
- 4.5°C ., 89% (TARSOAP)
- 1.3°C ., 56% (TOMINA)
 0.8°C ., 99% (ALL)
 0.2°C ., 82% (USAGE)

(13) The fourth word in the message will indicate the elevation of the lowest significant level in meters above sea-level. The same set of code words will be used as for pressure. The units-place digit in the elevation will be considered as zero and will not

be indicated in the code word. The tens-place digit will be changed to an even value in the same way as the relative humidity.

Examples: 570 will be coded as 580
 670 " " " " 660
 1630 " " " " 1620
 1750 " " " " 1760

(14) The hundreds and tens place digits will be indicated by the second code element in the word and the thousands place digit by the first code element.

Examples: 260 (UNDID)
 1000 (BULK)
 2260 (DUDISH)
 4000 (GUY)

(15) Thereafter will be given words indicating the pressure (nearest even mb.) and the temperature and relative humidity, respectively, at the elevation indicated by the fourth word in the message. These will be followed in the same sequence, by words indicating the elevation of the remaining significant levels, the corresponding pressures and the temperatures and relative humidities.

(16) Following these words the message will contain the "cloud" words. The cloud conditions transmitted in the message will be those observed at the time of take-off, together with those observed by the pilot as explained below.

(17) Clouds will be coded in the same way as in pilot balloon messages, (See section III, Circular dated July 1, 1933, "Instructions for reporting Pilot Balloon Observations"), except that more than ten-tenths may be sent when the pilot observes clouds which are not visible from the ground. Clouds observed by the pilot and not visible from the ground will be reconciled with those recorded by the ground observer. For example, if the latter records 8 St. Cu. and 2 A. St. and the pilot observes that the 2 A. St. are part of an overcast A. St. layer above the St. Cu., the message will contain one word indicating 10 A. St. followed by another word indicating 8 St. Cu.

(18) Whenever the plane reaches the cloud base the appropriate altitude word (see paragraph 12 of pilot balloon instructions referred to above) will follow the cloud word to which it refers. Likewise, whenever the plane reaches the cloud top a second altitude word will follow that indicating the cloud base. When only one altitude word follows a cloud word, it will be understood to indicate the height of the cloud base. When only one altitude word is used and this is intended to indicate the height of the cloud top, the altitude word will be preceded by the word "top".

(19) Cloud heights will be indicated in meters above sea level and will be transmitted only when the plane actually reaches the base or top.

(20) The form of precipitation encountered during the flight will be indicated by the appropriate word, e. g., MIST, RAIN, SNOW, etc. This word will be followed by words indicating the altitudes between which it was encountered, e. g., RAIN, SURFACE TUFFAS, i. e., from the ground to 3300 meters (above sea level); SNOW, TUBE TUNGO, from 1400 to 4800 meters (above sea level). When the precipitation comes from a higher altitude than is reached during the flight, the word indicating the upper limit of the precipitation will be an altitude word indicating the maximum height reached by the plane.

(21) Following the foregoing words, the message will contain the word THUNDERSTORM whenever, during the flight, Cu. Nb. clouds are within one mile of the station and thunder is heard.

Sample Message

<u>Code Word</u>	<u>Decoded Data</u>
FIVE	5 a. m., E. S. T.
UPPISH	1006 mb., surface pressure at time of take-off
INSURED	3°C., 80%, surface temperature and relative humidity at time of take-off.
UNGODLY	480 meters, elevation of 1st level above sea level.
TURNER	964 mb., pressures at 1st level.
INROAD	3°C., 78%, temperature and relative humidity at 1st level.
BUSHBY	1100 meters, elevation of 2nd level above sea level.
SUSTAIN	892 mb., pressure at 2nd level.
TUSSOCK	-5°C., 88%, temperature and relative humidity at 2nd level.
BUTMAN	1520 meters, elevation of 3rd level above sea level.
SUMMUS	850 mb., pressure at 3rd level.
SARGONID	-9°C., 48%, temperature and relative humidity at 3rd level.

<u>Code Word</u>	<u>Decoded Data</u>
DUBUKE	2100 meters, elevation of 4th level above sea level.
RUMSOT	788 mb., pressure at 4th level.
SOFETT	-6°C., 34%, temperature and relative humidity at 4th level.
DUMBUCK	2500 meters, elevation of 5th level above sea level.
RUMMY	750 mb., pressure at 5th level.
TURFING	-5°C., 36%, temperature and relative humidity at 5th level.
FUSSY	3800 meters, elevation of 6th level above sea level.
NUFFORM	638 mb., pressure at 6th level.
RIOTER	-12°C., 94%, temperature and relative humidity at 6th level.
MUCOUS	5080 meters, elevation of 7th level above sea level.
MUGGARD	542 mb. pressure at 7th level.
NANNETS	-19°C., 64%, temperature and relative humidity at 7th level.
CURRENCY	5/10 Ci. St. W
CENSOR	8/10 A. St. NW
TUFFOON	Base of A. St. 3800 meters above sea level.
TUGALOO	Top of A. St. 4200 meters above sea level.
SNOW) TYNDALL) TUGALOO)	Snow encountered between 2200 and 4200 meters above sea level.

C. F. Marvin,
Chief of Bureau.

